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ABSTRACT

This paper examines ways to make World Wide Web browsers accessible for individuals with disabilities, and through them, gain access to the information on the Web. It discusses which browsers can be made more accessible and evaluates different types of input. Mouse access, keyboard access, and voice input are reviewed. Processing aids, such as word prediction and abbreviation expansion programs, spell checkers, and text-to-speech programs, are described. The last section discusses how the output of a computer can be adapted by modifying the visual output, supplementing the visual output, or replacing the visual output. (CR)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Adapting Web Browsers for Accessibility

by Paul Hendrix of CforAT and Mike Birkmire of LINC

ED 432 102

SOME INTRODUCTORY CONCEPTS

The **Internet** can be thought of as a huge body of data and programs, all contained on thousands of computers, linked together in a vast network. The **World Wide Web**, or just **Web**, is a subset of the Internet, consisting of all of the data on the interconnected computers that is stored in **HTML** form. **HTML** (Hyper Text Markup Language) allows data to be stored in a way that can be presented in a graphically interesting manner, and more importantly, allows information in one document to be linked to data in another document on another computer. By activating these **links** between documents, the user can go from one bit of information to another as though they were all stored sequentially on the same computer, instead of being scattered on different machines around the world.

Information on the **Web** is accessed by means of software called **browsers**. These programs interpret the codes embedded in the **HTML** documents (or **Web pages**), and display the documents graphically. They also manage the process of following the **links** contained in the documents to information on other computers.

There is a tremendous amount of valuable information available on the **Web**; it is especially valuable for people with disabilities because this information can be located and accessed entirely through a computer, rather than by, for example, a trip to the library. It poses some unique access problems, however.

While a person's home computer can be modified for access, the data on the **Web** is not under the user's control, and may not be presented in an accessible manner. For example, some **Web pages** contain text information, while others display a picture of text - one can be read by a blind user's screen reader, the other cannot. Similarly, some **links** are designated by underlined text, whereas others may activated by clicking on an area of a graphic image. There is no consistency to the placement of **links**; they can appear anywhere on a page. These problems can be addressed by good, consistent design of **Web pages**, but the user can't rely on this. He or she must take whatever is out there, and not much of it is designed with access in mind.

This article examines ways to make **Web browsers** accessible, and through them, gain access to the information on the **Web**.

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WHICH BROWSERS

There are two major commercial browsers: **Netscape Navigator** (in the newest version, a part of Netscape Communicator), and Microsoft's **Internet Explorer**. These programs are available for both the Macintosh and Windows 95 platforms. There are also several special purpose browsers, such as **PwWebSpeak**, a specialized browser for blind access.

The **America OnLine** browser is a version of Internet Explorer, but is very much more difficult to access, due to a lack of menu bar features and a heavy reliance on graphics. Some of the concepts we'll be looking at apply to AOL, but this software is generally not a good choice if you are trying to adapt a computer for access to the Web.

We will be focusing on **Web browsers**, and not on alternative means of obtaining information from the Internet, such as Fetch, Archie, FTP, or Telnet. In part this is because of time constraints, but it is mostly because these other methods have largely been supplanted by Web browsers; most people will never use them. More information on these programs can be found in links in a helpful glossary of Internet terminology.

As usual, the access issues break down into those affecting the user's ability to **input** information into the computer, **processing aids** to simplify or accelerate the operation of the computer, and issues affecting **output** of information from the computer.

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INPUT

Mouse Access

Most aspects of Web browsing can be easily accomplished without a keyboard. Because **links** can appear anywhere on a **Web page**, they are most conveniently accessed by clicking with a mouse or alternative pointing device. Additionally, most browsers have toolbar icons and buttons, and at least menu options, to allow everything to be controlled by mouse. As a consequence, people who can use the mouse (or an **alternative pointing device**) can operate Web browsers fairly easily.

When browsing the Web, the need to enter text is infrequent. One text item that may need to be entered is the **URL** (the unique Internet address of each Web page) of a page you want to go to. This is not a lot of text, however, and once you get to the page, you can **bookmark** it, so that you never have to type in the **URL** again. Most of the time, you get to a page by following **links**, not be entering its address. The other text that may be entered is in a **search engine**, a piece of software, accessed with a **browser**, that searches the Web for pages containing certain words or phrases. This is generally only a few words of text, however. It also may be necessary at times to enter text into a form, such as your name and address to download a program. But that's about it. There's little enough text that occasional use of an **onscreen keyboard** would provide fairly complete access to a browser for someone who could use a mouse or mouse emulator.

Of course, there are other online tasks that do require text input, such as e-mail and chat rooms, but these do not poses unique access problems beyond what would be encountered in using a word processor.

Keyboard Access

A trickier problem is **keyboard access**. As we know, the trick with a lot of software is figuring how to operate it without the mouse. If we can operate it with keyboard commands, we can make an Intellikeys or Discover Board overlay, or make a custom switch scanning matrix, or use Morse Code, or conveniently make speech macros for a voice input system. So a crucial physical access issue is keyboard accessibility of Web browsers, and how we can then make them accessible to **switch** and **alternate keyboard** users.

Voice Input

Most voice input systems are not very good at controlling the mouse; it tends to be a pretty cumbersome process ("mouse up", "stop", "mouse left"). Therefore, keyboard based Web access methods will be helpful in using **voice input** as well. If you know the keyboard command to control a browser, you can make a speech macro to do this by voice.

PROCESSING AIDS

For our purposes, these fall into three categories: word prediction/abbreviation expansion programs, spell checkers, and text-to-speech software. Word prediction and abbreviation expansion programs work with Web browsers the same way they work with other software. They are primarily important for e-mail and online chat rooms, where large amounts of text must be entered. The same is true for spell checkers; the text that must be entered while actually browsing the web is usually limited to one or two word search terms.

Text-to-speech programs that speak highlighted text can be helpful to people with learning disabilities or low vision in accessing text on Web pages. The primary difficulty is when words on a page are presented as graphics, rather than actual text; the text-to-speech programs cannot read this, nor can the screen readers relied upon by blind users.

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OUTPUT

Adapting the output of a computer - which is primarily comprised of the information displayed on the monitor screen - can take the form of modifying this visual output, or supplementing or replacing it with auditory output.

Modifying the visual output usually means enlarging the text, or the cursor, or the entire displayed image.

Enlarging the text can be accomplished within the preferences controls of the browser itself.

There are several utility programs that enlarge the cursor for better visibility: **Biggy** (from RJ Cooper) and **Fat Cursor** (shareware) for the Macintosh, **MetaMouse** (shareware) for Windows 3.1, and **ToggleMouse** (shareware) and **Biggy** (RJ Cooper) for Windows 95.

Enlargement of the entire displayed image can be accomplished with a screen magnification program, like **inLarge** for the Macintosh (Alva Access), or **ZoomText** (AI Squared), **LPWindows** (Optelec), or **Magic** (MSI) for Windows. Screen magnification programs can be difficult to use, however, since only a part of the enlarged image can be displayed on the monitor at a time; it can be very hard to keep track of your place.

The visual image can also be modified by altering the color of the text and background for better contrast. Most Web browsers allow the user to control this feature, most screen magnification programs also incorporate color control, and Windows 95 has a high-contrast display setting built into its accessibility control panel.

By **supplementing the visual output**, we are referring to having the computer read aloud text that is visually identified and selected. This can be accomplished with several text-to-speech programs, described in the Processing Aids section.

Replacing the visual output with auditory output refers to using a screenreader program to audibly interpret the graphical information sent to the display screen by the computer. There are a number of these programs available, all of which deal somewhat differently with the problem of presenting the unpredictable graphic data produced by the Web browsers in audible form.

Screenreaders worked well under a text-based, command line operating system like DOS. The job of audibly representing the two-dimensional, simultaneously displayed, graphical information in the Mac and Windows environment is a complicated one, and these products take some training to be used effectively. On Windows-based machines, they also require a speech synthesizer to produce sound output. There are a number of external synthesizer devices available; some screenreaders support the TextAssist text-to-speech engine packaged with some SoundBlaster sound cards.

At present there is only one screenreader for the Macintosh, **outSpoken** (Alva Systems).

There are a number for the Windows platform, including:

JAWS for Windows - Henter-Joyce, Inc.

outSpoken for Windows - Alva Access

WindowEyes - GW Micro, Inc.

ScreenPower for Windows - Telesensory

The process of accessing the Web with a screen reader is somewhat circular. The original HTML document is in text form; the Web browser reads this text document and converts it into a graphical representation of the Web page, and the screen reader attempts to audibly translate this representation as it appears on the screen. One specialized browser, **PwWebSpeak**, audibly interprets the HTML code directly.

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